

**CLAIMS:**

We claim:

1. A method for slicing food items using at least one transverse slicer having at least one feed tube with a feed-tube diameter, said method comprising the steps of:
  - a) providing a plurality of food items, wherein said plurality of food items comprises at least one oversized food item having an oversized-item diameter that is greater than said feed-tube diameter and at least one acceptably-sized food item having an acceptably-sized item diameter that is less than said feed-tube diameter;
  - b) separating said at least one oversized food item from said at least one acceptably-sized food item;
  - 10 c) cutting said at least one oversized food item along its long axis into two or more segments;
  - d) feeding said at least one acceptably-sized food item and said segments through said at least one feed tube to said at least one transverse slicer; and
  - e) transversely slicing said at least one acceptably-sized food item and said  
15 segments to form a plurality of slices.
2. The method for slicing potatoes of Claim 1 wherein said providing a plurality of food items of step a) further comprises providing round and oblong potatoes.
3. The method for slicing food items of Claim 1 wherein said feeding of step d) is performed using a single conveyor.

4. The method for slicing food items of Claim 1 wherein said feeding of step d) is performed using a double-conveyor system, and further wherein said double-conveyor system comprises a spreading conveyor and a laning conveyor.
5. The method for slicing food items of Claim 1 wherein said feeding of step d) is preceded by the step of transporting said food items along an eductor flume of water propelled by an eductor.
6. The method for slicing food items of Claim 1 further comprising the step of:
  - f) transporting said slices along a post-slicer flume of water.
7. The method for slicing food items of Claim 6 further comprising the step of:
  - g) spreading said slices using an inverted siphon and a shallow, widening discharge channel.
8. The method for slicing food items of Claim 1 wherein said feeding of step d) is preceded by the step of dividing said plurality of food items into at least two channels.

9. A method for maximizing slicing yield while using a transverse slicer to slice a plurality of food items entering at a measurable rate, wherein said plurality of food items has an item velocity, said transverse slicer produces slices having a slice thickness, and said transverse slicer produces a number of slices per

5 revolution, said method comprising the steps of:

a) providing said plurality of food items on a conveyor having at least one lane, wherein each one of said at least one lane has a duty cycle defined as the ratio of the combined lengths of the food items to the length of the lane;

b) measuring the duty cycle of at least one lane to obtain at least one measured  
10 duty cycle;

c) feeding said plurality of food items into a transverse slicer; and

d) operating said transverse slicer so that said slicer has a cutting speed of X rotations per minute, wherein X is substantially equal to or slightly greater than a minimum rotational velocity, and said minimum rotational velocity  
15 equals the item velocity multiplied by one of said at least one measured duty cycle, divided by the slice thickness, and divided by the number of slices per revolution.

10. The method for maximizing slicing yield of Claim 9 wherein X in step d) is substantially equal to or slightly greater than the item velocity multiplied by the largest of said at least one measured duty cycle, divided by the slice thickness, and divided by the number of slices per revolution.

11. The method for maximizing slicing yield of Claim 9 wherein said item velocity is determined by measuring the velocity of said food items.
12. The method for maximizing slicing yield of Claim 9 wherein said conveyor has a predetermined conveying velocity, and further wherein said predetermined conveying velocity is used as the item velocity.
13. The method for maximizing slicing yield of Claim 9 wherein said conveyor has a variable conveying velocity and an adjustable mass set point.
14. The method for maximizing slicing yield of Claim 13 wherein said at least one measured duty cycle is used to adjust the mass set point.
15. The method for maximizing slicing yield of Claim 8 wherein said feeding of step c) comprises distributing said food items among at least two lanes and orienting said food items substantially lengthwise within said at least two lanes.

16. The method for maximizing slicing yield of Claim 8 wherein an average minimum rotational velocity is obtained by averaging the minimum rotational velocity over time, a standard deviation is obtained from the difference between the average minimum rotational velocity and the minimum rotational velocity over time, and further wherein X in step d) is substantially equal to the larger of the following: i) the sum of the average minimum rotational velocity and the product of a multiplying factor and the standard deviation; and ii) the minimum rotational velocity.
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17. The method for maximizing slicing yield of Claim 16 wherein the multiplying factor ranges from about 0.5 to about 2.0.

18. An apparatus for dividing a flow of food items into separate channels comprising:
  - a descending housing;
  - at least one fixed divider enclosed within said descending housing; and
  - a moveable diverter hinged at its bottom end to the top of each divider.
19. The apparatus for dividing a flow of food items of Claim 18 further comprising a fluid flow entrance located at the top of said descending housing.
20. The apparatus for dividing a flow of food items of Claim 18 further comprising a feed conveyor located at the top of said descending housing.
21. The apparatus for dividing a flow of food items of Claim 18 wherein the top end of each moveable diverter is connected to a linear positioning member moveably housed within a horizontal positioning carriage.
22. The apparatus for dividing a flow of food items of Claim 18 wherein each moveable diverter comprises a stiff plate.
23. The apparatus for dividing a flow of food items of Claim 18 wherein each moveable diverter is perforated.

24. The apparatus for dividing a flow of food items of Claim 18 further comprising at least two eductors attached to the bottom of said descending housing, each one of said eductors comprising an inlet pipe, a product-drawing section, and a discharge pipe, and further wherein said descending housing and said at least one divider
- 5 define at least two channels, each channel leading to one of said product-drawing sections.

25. A method for transporting potatoes comprising the steps of:

- a) supplying a flow of water through at least one inlet pipe;
- b) introducing a plurality of potatoes into the flow of water in at least product-drawing section;

5 c) propelling said plurality of potatoes within the flow of water through at least one discharge pipe.

26. The method for transporting potatoes of Claim 25 wherein said supplying a flow of water of step a) comprises pumping.

27. The method for transporting potatoes of Claim 25 wherein each inlet pipe of step a) comprises a restrictive valve.

28. The method for transporting potatoes of Claim 25 wherein each product-drawing section of step b) comprises a venturi neck.

29. The method for transporting potatoes of Claim 25 wherein:

the supplying of step a) further comprises dividing the flow of water into  
at least two inlet pipes;

the introducing of step b) further comprises introducing the potatoes in at  
5 least two product-drawing sections; and

the propelling of step c) further comprises propelling the potatoes through  
at least two discharge pipes.

30. An apparatus for controllably distributing a plurality of food-slices from a flume of water onto a conveyor, said apparatus comprising:

an inverted siphon having an inverted-siphon outlet, said inverted-siphon outlet comprising a shallow vertical channel that fans outward from bottom to top;

5 and

a spreader discharge comprising a short channel attached at about a right angle to the top end of said inverted-siphon outlet.

31. The apparatus for controllably distributing a plurality of food-slices of Claim 30 wherein said spreader discharge is tilted to one side.

32. The apparatus for controllably distributing a plurality of food-slices of Claim 30 wherein said short channel of said spreader discharge comprises a curved bottom surface that is convex when viewed from above.

33. The apparatus for controllably distributing a plurality of food-slices of Claim 30 wherein said short channel of said spreader discharge comprises a curved bottom surface that is concave when viewed from above.

34. The apparatus for controllably distributing a plurality of food-slices of Claim 30 wherein said short channel of said spreader discharge is adjustable, and further wherein said short channel is mechanically linked to a manually controlled actuator.
35. The apparatus for controllably distributing a plurality of food-slices of Claim 30 wherein said short channel of said spreader discharge is adjustable, and further wherein said short channel is mechanically linked to an automatically controlled actuator.

36. A method for reducing the minor-dimension diameter of a food item using a segmented cutter comprising at least one blade, said method comprising the steps of:
- 5      a) providing a food item;
- b) orienting the food item such that its longest axis is substantially parallel to said at least one blade of the segmented cutter;
- c) passing the food item lengthwise through the segmented cutter, thereby forming at least two segments.
37. The method for reducing the minor-dimension diameter of a food item of Claim 36 wherein said segmented cutter further comprises a hollow cylinder having a centerline and at least three blades radiating from an axis parallel to the centerline and secured at their radial ends to the inner surface of said cylinder.
38. The method for reducing the minor-dimension diameter of a food item of Claim 37 wherein said at least three blades are curved.
39. The method for reducing the minor-dimension diameter of a food item of Claim 37 wherein said orienting of step b) further comprises positioning said at least three blades so that said axis substantially aligns with the food item's longest axis.

40. The method for reducing the minor-dimension diameter of a food item of Claim 36 wherein said segmented cutter has an adjustable position.